

Notice of Allowability

Application No.

10/673,302

Examiner

Rip A. Lee

Applicant(s)

WANG, SHAOTIAN

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-10.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 01-09-04
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: Claims 1-10 are allowed over the closest references, U.S. Patent No. 5,770,663 to Peifer *et al.*, U.S. Patent No. 6,765,074 to Sartain, U.S. Patent No. 6,211,311 to Wang *et al.*, and U.S. Patent No. 6,812,304 to Meverden *et al.*

The present invention is drawn to a process comprising polymerization of ethylene and/or alpha olefin in the presence of a supported metallocene catalyst and triisobutylaluminum. The supported catalyst is prepared by treating silica with a silane compound and subsequently, treating the silane treated silica with an organoboron compound. The resulting material is then combined with a group 4 metallocene and an aluminoxane (Al/M ratio in the range of about 20 to about 2000). The triisobutylaluminum is added to the reactor in an amount of about 10 to about 1000 moles per mole of group 4 metal.

Peifer *et al.* teaches a standard process for polymerization of olefins by combining a solution of group 4 metallocene and methylaluminoxane and depositing the resulting material onto trimethylaluminum treated silica. The reference does not teach treatment of silica support as described in the present claims, and it does not teach polymerization in presence of additional triisobutylaluminum.

Sartain teaches a process for olefin polymerization in which the combination of group 4 metallocene-like complex and MAO/C₁₈H₃₇OH is supported onto organoaluminum or organoboron treated silica. The reference clearly teaches treatment of silica with either modifier, but it does not suggest the combination of modifier. Even if one of ordinary skill in the art were astute enough to arrive at use of a sequential treatment using both modifiers, as presently

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claimed, one of ordinary skill in the art would not arrive at the subject matter of the present claims because further use of triisobutylaluminum in the polymerization system is neither taught or suggested in the text.

Wang *et al.* describes a method for treating supports by treating silica with hexamethyldisilazane followed by calcination. In a subsequent step, the silica is treated again with triethylboron. The treated silica is combined with a metallocene-like precursor and ionic activator. The reference also teaches use of aluminoxane activators. Olefin polymerization reactions are carried out in the presence of triethylaluminum, which has been added to the reactor along with the supported catalyst. The latter step is illustrated in the examples but not discussed in the text, and use of triisobutylaluminum in lieu of triethylaluminum is not taught. One of ordinary skill in the art would have recognized that the trialkylaluminum has been added to scavenge impurities. Applicants have shown, however, that use of triisobutylaluminum unexpectedly results in a catalyst which exhibits higher activity than one in which triethylaluminum is used. Based on the teachings of Wang *et al.*, one of ordinary skill in the art would not have found it obvious to arrive at the subject matter of the present claims.

Meverden *et al.* teaches a process of olefin polymerization using a supported catalyst. The silica support is treated with organosilane followed by treatment with an organoborane. The treated silica is then combined with a group 4 metallocene-like complex and ionic activator. The final step of catalyst preparation involves addition of an organoaluminum to the resulting supported catalyst. Prior to polymerization, a second organoaluminum such as triethylaluminum or triisobutylaluminum is added to the reactor. All elements of the present invention are disclosed in the reference except combination of a metallocene with an aluminoxane activator.

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Since there is no teaching or suggestion of such a step, one of ordinary skill in the art would not be motivated to replace ionic activators of Meverden *et al.* with an aluminosilicate in order to arrive at the subject matter of the present claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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January 27, 2005



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